

THE S-BLOCK ELEMENTS**Single Correct Answer Type**

- The element which on burning in air gives peroxide is
a) Lithium b) Sodium c) Rubidium d) Caesium
- If CO_2 is passed in excess into lime water, the milkiness first formed disappears due to:
a) Reversal of original reaction
b) Formation of volatile calcium derivative
c) Formation of soluble calcium bicarbonate
d) Formation of soluble magnesium hydroxide
- Celestine is an ore of:
a) Ba b) Ca c) Sr d) Mg
- Which substance gives a different flame colouration from the others?
a) Nitre b) Caustic potash c) Potassium chloride d) Table salt
- Which of the following reaction does not liberate gaseous product?
a) $\text{AlCl}_3 + \text{NaOH} \rightarrow$ b) $\text{NaOH} + \text{P(white)} + \text{H}_2\text{O} \rightarrow$
c) $\text{Al} + \text{NaOH} \xrightarrow{\Delta}$ d) $\text{Zn} + \text{NaOH} \xrightarrow{\Delta}$
- The outermost electron is most loosely held in:
a) Li b) Na c) K d) Cs
- Ionic compound BaSO_4 is insoluble in water due to
a) High lattice energy b) Low lattice energy
c) Low hydration energy d) Both (a) and (c)
- Which of the following acts as reducing agent as well as oxidising agent?
a) Na_2O b) Na_2O_2 c) NaNO_3 d) KNO_3
- When sodium is heated in flame it gives:
a) Golden yellow colour b) Crimson red colour c) Brick red colour d) Violet colour
- Which property increases in magnitude as the atomic number of alkali metals increases?
a) Electronegativity
b) First ionization energy
c) Ionic radius
d) Melting point
- Which can undergo both oxidation and reduction?
a) Ba^{2+} b) BaCl_2 c) Ba^+ d) BaH_2
- Which one of the following electrolytes is used in Down's process of extracting sodium metal?
a) $\text{NaCl} + \text{KCl} + \text{KF}$ b) NaCl c) $\text{NaOH} + \text{KCl} + \text{KF}$ d) $\text{NaCl} + \text{NaOH}$
- The compound X on heating gives a colourless gas. The residue is dissolved in water to obtain Y. Excess CO_2 is bubbled through aqueous solution of Y, Z is formed. Z on gentle heating gives back X. The compound X is:
a) CaCO_3 b) Na_2CO_3 c) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ d) K_2CO_3
- On dissolving moderate amount of sodium metal in liquid NH_3 at low temperature, which one of the following does not occur?
a) Blue coloured solution is obtained
b) Na^+ ions are formed in solution
c) Liquid ammonia becomes good conductor of electricity



- d) Liquid NH_3 remains diamagnetic
15. On heating washing soda, we get:
 a) CO b) $\text{CO} + \text{CO}_2$ c) CO_2 d) $\text{H}_2\text{O}(v)$
16. When sodium chloride solution is electrolysed, the gas that is liberated at the cathode is
 a) Oxygen b) Chlorine c) Hydrogen d) Air
17. The compound which is not soluble in dil. HCl is:
 a) BaSO_4 b) MnS c) ZnS d) BaCO_3
18. One mole of magnesium nitride on the reaction with excess water gives:
 a) Two mole of nitric acid
 b) One mole of nitric acid
 c) Two mole of ammonia
 d) One mole of ammonia
19. The alkali metal that reacts with nitrogen directly to form nitride is
 a) Li b) K c) Na d) Rb
20. The non-metal which is not affected by NaOH:
 a) C b) Si c) P d) S
21. In a sodium chloride crystal, each chloride ion is surrounded by:
 a) 4Na^+ ions b) 6Na^+ ions c) 1Na^+ ion d) 2Na^+ ions
22. Which of the following hydroxides is amphoteric in nature?
 a) $\text{Be}(\text{OH})_2$ b) $\text{Mg}(\text{OH})_2$ c) $\text{Ca}(\text{OH})_2$ d) $\text{Ba}(\text{OH})_2$
23. Which category of salts of alkaline earth metals is not found in solid state, but found in solution state?
 a) Carbonates b) Bicarbonates c) Hydroxides d) Sulphates
24. On strong heating CaO and C, the products formed are:
 a) Ca and CO b) CaC_2 and CO c) $\text{Ca}(\text{OH})_2$ d) CaC_2 and CO_2
25. Which of the statements is not true?
 a) $\text{K}_2\text{Cr}_2\text{O}_7$ solution in acidic medium is orange
 b) $\text{K}_2\text{Cr}_2\text{O}_7$ solution becomes yellow on increasing the pH beyond 7
 c) On passing H_2S through acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution, a milky colour is observed
 d) $\text{Na}_2\text{Cr}_2\text{O}_7$ is preferred over $\text{K}_2\text{Cr}_2\text{O}_7$ in volumetric analysis
26. The salt added to table salt to make it flow freely in rainy season is:
 a) KCl b) NH_4Cl c) $\text{Ca}_3(\text{PO}_4)_2$ d) NaHCO_3
27. Sodium bicarbonate solution on adding to magnesium sulphate solution forms:
 a) Magnesium bicarbonate
 b) Magnesium hydroxide
 c) Basic magnesium carbonate
 d) Magnesium carbonate
28. Ordinary blackboard chalk is made up of:
 a) CaCO_3 b) Gypsum c) Fluorspar d) $\text{Ca}_3(\text{PO}_4)_2$
29. Which alkali metal is frequently used in solar cells?
 a) Na b) Li c) K d) Cs
30. In the replacement reaction

$$\text{C} \rhd \text{CI} + \text{MF} \rightarrow \text{C} \rhd \text{CF} + \text{MI}$$
 The reaction will be most favourable if M happens to be:
 a) Na b) K c) Rb d) Li
31. Indian saltpetre is:
 a) KNO_3 b) NaNO_3 c) NaCl d) Na_2CO_3

32. The plaster of Paris is:
a) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ b) CaSO_4 c) $2\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ d) $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$
33. A solid is a compound of group 1 element and it gives a bright red colour in the flame test. The solid is
a) LiBr b) CsCl c) KCl d) NaCl
34. Which one is not a correct formula?
a) H_2S b) NaHSO_4 c) SiO_2 d) NaSiO_3
35. A piece of magnesium ribbon was heated to redness in an atmosphere of N_2 and then treated with H_2O , the gas evolved is:
a) Ammonia b) Hydrogen c) Nitrogen d) Oxygen
36. LiAlH_4 is obtained by reacting an excess of ...with an ethereal solution of AlCl_3 :
a) LiCl b) LiH c) Li d) LiOH
37. The hydration energy of Mg^{2+} ions is larger than that of:
a) Al^{3+} b) Na^+ c) Be^{2+} d) Mg^{3+}
38. Based on lattice energy and other considerations which one of the following alkali metal chlorides is expected to have the highest melting point?
a) RbCl b) KCl c) NaCl d) LiCl
39. When CO_2 is bubbled into an aqueous solution of Na_2CO_3 , the following is formed:
a) H_2O b) OH^- c) NaHCO_3 d) NaOH
40. Microcosmic salt is
a) $\text{Na}_4\text{P}_2\text{O}_7$ b) $\text{Na}(\text{NH}_4)\text{HPO}_4$ c) $\text{Na}(\text{NH}_3)\text{HPO}_4 \cdot 4\text{H}_2\text{O}$ d) MgNH_4PO_4
41. Acidified solution of sodium thiosulphate is unstable because in thiosulphate:
a) The sulphur atoms are at unstable oxidation state of +2
b) The two sulphur atoms are in different oxidation states of +5 and -1
c) The S—S bond are unstable bonds
d) Thio compounds contain sulphur in zero oxidation state
42. Which of the following statements is false regarding saline hydrides?
a) In the molten state they conduct electricity
b) They dissolve in water giving off hydrogen
c) They are used as reducing agents
d) They are covalent in nature
43. Chlorophyll contains:
a) Na b) K c) Mg d) Mn
44. Which of the following is not an ore of magnesium?
a) Carnallite b) Dolomite c) Calamine d) Sea water
45. Fire extinguishers contain H_2SO_4 and:
a) NaHCO_3 and Na_2CO_3 b) NaHCO_3 solution c) Na_2CO_3 d) CaCO_3
46. Sodium thiosulphate is prepared by
a) Boiling Na_2SO_3 solution with S in alkaline medium
b) Reducing Na_2SO_4 solution with H_2S
c) Boiling Na_2SO_3 solution with S in acidic medium
d) Neutralising $\text{H}_2\text{S}_2\text{O}_3$ solution with NaOH
47. The only element which is radioactive among alkali metals is:
a) Cs b) Fr c) Rb d) Li
48. Common table salt becomes moist and does not pour easily in rainy season because:
a) It contains magnesium chloride
b) It contains magnesium carbonate
c) It melts slightly in rainy season



- d) Sodium chloride is hygroscopic
49. Mg burns in CO to produce
 a) $\text{MgO} + \text{CO}$ b) MgO_2 c) $\text{MgO} + \text{C}$ d) MgCO_3
50. Which ion has closed shell electronic configuration?
 a) Li b) Li^+ c) Li^{2+} d) Li^-
51. Hypo is used in:
 a) Iodimetric titrations b) Iodometric titrations c) Photography d) All of these
52. Molecular formula of Glauber's salt is
 a) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ b) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ c) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ d) $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$
53. Which statement is false for alkali metals?
 a) Lithium is the strongest reducing agent
 b) Sodium is amphoteric in nature
 c) Li^+ is exceptionally small
 d) All alkali metals give blue solution in liquid ammonia
54. Alkaline earth metal oxide having the co-ordination number four is:
 a) BeO b) MgO c) SrO d) CaO
55. Sodium thiosulphate is used in photography
 a) As AgBr grain is reduced to non-metallic silver b) To convert metallic silver into silver salt
 c) To remove reduced silver d) To remove undecomposed AgBr in the form of $\text{Na}_3[\text{Ag}(\text{S}_2\text{O}_3)_2]$ (a complex salt)
56. NaOCl is used as a bleaching agent and sterilising agent. It can be synthesised by the action of
 a) NaCl with H_2O b) NH_4Cl with NaOH
 c) Cl_2 with cold and dilute NaOH d) Cl_2 with hot and concentrated NaOH
57. A sudden large jump between the values of second and third ionization energies of an element would be associated with the electronic configuration:
 a) $1s^2, 2s^2 2p^6, 3s^1$ b) $1s^2, 2s^2 2p^6, 3s^2 3p^1$ c) $1s^2, 2s^2 2p^6, 3s^2 3p^2$ d) $1s^2, 2s^2 2p^6, 3s^2$
58. Soda lime is
 a) NaOH b) NaOH and CaO c) CaO d) Na_2CO_3
59. Sodium thiosulphate is formed when:
 a) NaOH is neutralised by H_2SO_4
 b) Na_2S is boiled with S
 c) Na_2SO_3 is boiled with Na_2S and I_2
 d) Na_2SO_4 is boiled with Na_2S
60. Potash alum is used in purification of water because:
 a) It kills the micro-organisms
 b) It precipitates the colloidal matter
 c) It removes the hardness of water
 d) It catalyses the removal of impurities
61. The function of sand in mortar is:
 a) To decrease the hardness
 b) To make the mass compact
 c) To decrease the plasticity of the mass
 d) To prevent the excess shrinkage because of which cracks may result
62. On strong heating sodium bicarbonate changes into
 a) Sodium monoxide b) Sodium hydroxide c) Sodium carbonate d) Sodium peroxide
63. In the hardening stage of plaster of Paris, the compound formed is
 a) CaSO_4 b) Orthorhombic $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$



75. A substance which gives a brick red flame and breaks down on heating giving oxygen and a brown gas is:
- Calcium carbonate
 - Magnesium nitrate
 - Magnesium carbonate
 - Calcium nitrate
76. Out of the following metals that cannot be obtained by electrolysis of the aqueous solution of its salts is
- Ag
 - Cr
 - Cu
 - Mg
77. Which of the following carbonates decomposes at lowest temperature?
- $MgCO_3$
 - $CaCO_3$
 - $SrCO_3$
 - $BaCO_3$
78. A colourless salt gives violet colour to Bunsen flame and also turns moisture litmus paper blue. It is:
- Na_2CO_3
 - KNO_3
 - K_2CO_3
 - $Cu(OH)_2$
79. The compound which is insoluble in hot water and NH_3 is:
- $PbCl_2$
 - $AgCl$
 - $BaSO_4$
 - None of these
80. Milk of magnesia is:
- $Mg(OH)_2$
 - $Ca(OH)_2$
 - $Ba(OH)_2$
 - None of these
81. Which of the following is different from the other three?
- MgO
 - SnO
 - ZnO
 - Cr_2O_3
82. The wire of flash bulbs are made up of:
- Mg
 - Ba
 - Cu
 - Ag
83. Sodium sulphate is soluble in water whereas barium sulphate is sparingly soluble because:
- The hydration energy of sodium sulphate is more than its lattice energy
 - The lattice energy has no role to play in solubility
 - The hydration energy of sodium sulphate is less than its lattice energy
 - None of the above
84. When washing soda is heated
- CO_2 is released
 - $CO + CO_2$ is released
 - CO is released
 - Water vapour is released
85. Which of the following substances is used in the laboratory for fast drying of neutral gases?
- Sodium sulphate
 - Phosphorus pentoxide
 - Sodium phosphate
 - Anhydrous calcium chloride
86. The oxide of which metal is most stable to heat?
- K
 - Ag
 - Hg
 - All of these
87. When $NaCl$ is dissolved in water, the sodium ions become:
- Oxidized
 - Reduced
 - Hydrolysed
 - Hydrated
88. Which of the alkali metal chloride is expected to have highest m.p.?
- $LiCl$
 - $NaCl$
 - KCl
 - $RbCl$
89. When carbon monoxide is passed over solid caustic soda heated to $200^\circ C$, it forms:
- Na_2CO_3
 - $NaHCO_3$
 - $HCOONa$
 - None of these
90. Sodium chloride is known as:
- Rock salt
 - Common salt
 - Table salt
 - All of these
91. The first ionization energies of alkaline earth metals are higher than those of the alkali metals. This is because:
- There is increase in the nuclear charge of the alkaline earth metals
 - There is decrease in the nuclear charge of the alkaline earth metals
 - There is no change in the nuclear charge
 - None of the above

92. Both Be and Al become passive on reaction with conc. Nitric acid due to:
- The non-reactive nature of the metal
 - The non-reactive nature of the acid
 - The formation of an inert layer of oxide on the surface of the metals
 - None of the above
93. A metal '*M*' reacts with N_2 to give a compound '*A*' (M_3N). '*A*' on heating at high temperature gives back '*M*' and '*A*' on reacting with H_2O gives a gas *B*. '*B*' turns $CuSO_4$ solution blue on passing through it. *M* and *B* can be
- Al and NH_3
 - Li and NH_3
 - Na and NH_3
 - Mg and NH_3
94. Which one of the following reactions occur at the anode, in the Castner process of extracting sodium metal?
- $H_2 \rightarrow 2H^+ + 2e^-$
 - $2Cl^- \rightarrow Cl_2 + 2e^-$
 - $4OH^- \rightarrow 2H_2O + O_2 + 4e^-$
 - $Na^+ + e^- \rightarrow Na$
95. The most basic oxide among the following is:
- Na_2O
 - BaO
 - As_2O_3
 - Al_2O_3
96. Sodium reacts with water more vigorously than lithium because it:
- Has higher atomic weight
 - Is more electronegative
 - Is more electropositive
 - Is a metal
97. The starting material used in Solvay's process are
- Sodium sulphate
 - Brine solution
 - Carnallite
 - All of these
98. Elements of IIA group having electronic configuration ns^2 are called alkaline earth elements because:
- They only occur in earth
 - Their salts form only alkaline solution
 - They are form divalent cations only
 - Their oxides are non-fusible like earth matter
99. When sulphur is heated with $NaOH(aq)$ the compounds formed are:
- $Na_2S + H_2O$
 - $Na_2SO_3 + H_2O$
 - $Na_2S + Na_2S_2O_3 + H_2O$
 - $Na_2S_2O_3 + H_2O$
100. Alloys of which metal are light and strong and are used in the manufacture of aeroplane parts?
- Cr
 - Sn
 - Fe
 - Mg
101. Which of the following metals has stable carbonates?
- Al
 - Si
 - Mg
 - Na
102. The element which does not dissolve in caustic soda is:
- Silicon
 - Aluminium
 - Zinc
 - Cadmium
103. The products obtained on heating $LiNO_3$ will be
- $LiNO_2 + O_2$
 - $Li_2O + NO_2 + O_2$
 - $Li_3N + O_2$
 - $Li_2O + OH + O_2$
104. A gas reacts with CaO and not with $NaHCO_3$ is:
- CO_2
 - Cl_2
 - O_2
 - N_2
105. Alkali metals act as
- Good dehydrating agent
 - Good reducing agent
 - Good oxidising agent
 - None of these
106. Calcium hydride on hydrolysis gives:
- $CaO + H_2$
 - $Ca(OH)_2$ only
 - $Ca(OH)_2 + H_2$
 - CaO only
107. NaOH is not used in:
- Soap
 - Synthetic petrol
 - Paper
 - Synthetic fibre



108. Sodium peroxide in contact with moist air turns white due to the formation of:
 a) Na_2O b) Na_2CO_3 c) NaHCO_3 d) NaOH
109. Na_2SO_3 and NaHCO_3 may be distinguished by treating their aqueous solution with:
 a) Litmus solution b) Dil. Acid c) MgO d) MgSO_4
110. Excess of dilute sodium hydroxide solution is gradually added with shaking to an aqueous solution of zinc sulphate. What would you observe?
 a) A light blue precipitate is first formed which finally dissolves to give a deep blue solution
 b) A white precipitate appears which dissolves to give a colourless solution
 c) A white precipitate is formed which does not dissolve
 d) No change takes place and the solution remains clear
111. Which of the following metal carbonates is decomposed on heating?
 a) Na_2CO_3 b) MgCO_3 c) K_2CO_3 d) Rb_2CO_3
112. The weakest base among NaOH , $\text{Ca}(\text{OH})_2$, KOH and $\text{Be}(\text{OH})_2$ is:
 a) NaOH b) $\text{Ca}(\text{OH})_2$ c) KOH d) $\text{Be}(\text{OH})_2$
113. The chemical formula of feldspar is
 a) KAlSi_3O_8 b) Na_3AlF_6
 c) NaAlO_2 d) $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 4\text{Al}(\text{OH})_3$
114. Caesium oxide will be:
 a) Very strongly basic b) Acidic c) Weakly basic d) Amphoteric
115. Which of the following has minimum values of cation-anion size ratio?
 a) NaCl b) KCl c) MgCl_2 d) CaF_2
116. Which electronic configuration represents the configuration of the most electropositive element?
 a) $[\text{He}]2s^1$ b) $[\text{Xe}]6s^1$ c) $[\text{He}]2s^2$ d) $[\text{Xe}]6s^2$
 d) None of the above
117. When a crystal of caustic soda is exposed to air, a liquid layer is deposited because:
 a) Crystal melts
 b) Crystal loses water
 c) Crystal absorbs moisture and CO_2
 d) Crystal sublimates
118. The activity of alkaline earth metals as reducing agents
 a) Decreases from Be to Ba
 b) Increases from Be to Ba
 c) Increases from Be to Ca and decreases from Ca to Ba
 d) Decreases from Be to Ca and increases from Ca to Ba
119. Nitrates of I group (except LiNO_3) on heating give:
 a) O_2 b) N_2 c) NO d) NO_2
120. Which is industrially prepared by the electrolysis of aqueous NaCl ?
 a) Na_2CO_3 b) NaHCO_3 c) NaOH d) NaOCl
121. A chloride dissolves appreciably in cold water. When placed on a platinum wire in Bunsen flame, no distinctive colour is noticed. Which one is cation?
 a) Mg^{2+} b) Ba^{2+} c) Pb^{2+} d) Ca^{2+}
122. Consider the following abbreviations for hydrated alkali ions.
 $X = [\text{Li}(\text{H}_2\text{O})_n]^+$
 $Y = [\text{K}(\text{H}_2\text{O})_n]^+$
 $Z = [\text{Cs}(\text{H}_2\text{O})_n]^+$
 What is the correct order of size of these hydrated alkali ions?
 a) $X > Y > Z$ b) $Z > Y > X$ c) $X = Y = Z$ d) $Z > X > Y$



123. Who discovered radium?
a) Bohr b) Fermi c) Curie d) Rutherford
124. Gun powder is:
a) $\text{KNO}_3 + \text{Charcoal} + \text{S}$ b) $\text{NaNO}_3 + \text{KNO}_3 + \text{S}$ c) $\text{NaNO}_3 + \text{S}$ d) None of these
125. Which alkali metal reacts with nitrogen to form nitride?
a) Li b) Na c) Cs d) None of these
126. When KI is added to acidified solution of sodium nitrite then
a) NO gas is liberated and I_2 is set free b) N_2 gas is liberated and HI is produced
c) N_2O gas is liberated and I_2 is set free d) N_2 gas is liberated and HOI is produced
127. When carbon monoxide is passed over solid caustic soda heated to 200°C , it forms
a) Na_2CO_3 b) NaHCO_3 c) HCOONa d) CH_3COONa
128. Aqueous solution of $\text{Na}_2\text{S}_2\text{O}_3$ on reaction with Cl_2 gives
a) $\text{Na}_2\text{S}_4\text{O}_6$ b) NaHSO_4 c) NaCl d) NaOH
129. Hesse's process is a method for the manufacture of:
a) NaOH b) HNO_3 c) H_2SO_4 d) Bleaching powder
130. Beryllium and aluminium exhibit many properties which are similar. But, the two elements differ in
a) Exhibiting maximum covalency in compounds b) Forming polymeric hydrides
c) Forming covalent halides d) Exhibiting amphoteric nature in their oxides
131. Dolomite is a carbonate ore of:
a) Ca b) Mg c) Both Ca and Mg d) Neither Ca nor Mg
132. Caustic soda is:
a) Efflorescent b) Deliquescent c) Hygroscopic d) Oxidant
133. Tincal is:
a) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ b) NaNO_3 c) $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ d) NaCl
134. The yellow light for illumination of lamps is from:
a) Mercury vapour lamp
b) Sodium vapour lamp
c) Neon gas lamp
d) None of these
135. Calcium cyanamide reacts with steam to form ammonia and.....
a) $\text{Ca}(\text{OH})_2$ b) CaO c) $\text{Ca}(\text{HCO}_3)_2$ d) CaCO_3
136. The nitride ion in lithium nitride is composed of:
a) 7 protons +7 electrons
b) 10 protons +7 electrons
c) 7 protons +10 electrons
d) 10 protons +10 electrons
137. Alkali metals have high oxidation potential and hence, they behave as
a) Oxidising agents b) Lewis bases c) Reducing agents d) Electrolytes
138. Which represents nitrolime?
a) $\text{CaCN}_2 + \text{C}$ b) $\text{CaC}_2 + \text{N}_2$ c) $\text{Ca}(\text{CN})_2 + \text{Ca}(\text{NO}_3)_2$ d) None of these
139. In which of the following reactions, MgO is not formed?
a) $\text{Mg} + \text{CO}_2 \rightarrow$ b) $\text{Mg} + \text{dil. HNO}_3 \rightarrow$ c) $\text{Mg} + \text{NO} \xrightarrow{\Delta}$ d) $\text{Mg} + \text{B}_2\text{O}_3 \rightarrow$
140. Which of the following metal carbonates decomposes on heating?
a) MgCO_3 b) Na_2CO_3 c) K_2CO_3 d) Rb_2CO_3
141. Compared with the alkaline earth metals, the alkali metals exhibit
a) Greater hardness b) Smaller ionic radii
c) Lower ionisation energies d) Highest boiling points

: ANSWER KEY :

1)	b	2)	c	3)	c	4)	d	5)	a	6)	d	7)	d	8)	b
9)	a	10)	c	11)	c	12)	a	13)	a	14)	d	15)	d	16)	c
17)	a	18)	c	19)	a	20)	a	21)	b	22)	a	23)	b	24)	b
25)	d	26)	c	27)	d	28)	b	29)	d	30)	c	31)	a	32)	d
33)	a	34)	d	35)	a	36)	b	37)	b	38)	c	39)	c	40)	b
41)	b	42)	d	43)	c	44)	c	45)	a	46)	a	47)	b	48)	a
49)	c	50)	b	51)	d	52)	d	53)	b	54)	c	55)	d	56)	c
57)	d	58)	b	59)	c	60)	b	61)	d	62)	c	63)	d	64)	d
65)	a	66)	a	67)	b	68)	c	69)	b	70)	a	71)	b	72)	b
73)	c	74)	b	75)	d	76)	d	77)	a	78)	c	79)	c	80)	a
81)	a	82)	a	83)	a	84)	d	85)	d	86)	a	87)	d	88)	a
89)	c	90)	d	91)	a	92)	c	93)	b	94)	c	95)	a	96)	c
97)	b	98)	d	99)	c	100)	d	101)	d	102)	d	103)	b	104)	a
105)	b	106)	c	107)	b	108)	d	109)	d	110)	b	111)	b	112)	d
113)	a	114)	a	115)	c	116)	b	117)	c	118)	b	119)	a	120)	c
121)	a	122)	a	123)	c	124)	a	125)	a	126)	a	127)	c	128)	b
129)	d	130)	a	131)	c	132)	b	133)	c	134)	b	135)	d	136)	c
137)	c	138)	a	139)	b	140)	a	141)	c						

: HINTS AND SOLUTIONS :

- 1 (b)
Alkali metals on burning in air give monoxide, peroxide or superoxide.
Li forms monoxide.
$$2\text{Li} + \frac{1}{2}\text{O}_2 \rightarrow \text{Li}_2\text{O}$$

Na form peroxide as well as monoxide.
$$2\text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O}_2$$

$$2\text{Na} + \frac{1}{2}\text{O}_2 \rightarrow \text{Na}_2\text{O}$$

K, Rb, and Cs form superoxide.
$$M(= \text{K, Rb, Cs}) + \text{O}_2 \rightarrow \text{MO}_2$$
- 2 (c)
$$\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \underset{\text{Insoluble}}{\text{CaCO}_3} + \text{H}_2\text{O}$$

$$\text{CaCO}_3 + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \underset{\text{Soluble}}{\text{Ca}(\text{HCO}_3)_2}$$
- 3 (c)
Celestine is SrSO_4 .
- 4 (d)
NaCl is table salt; rest all are potassium salts.
- 5 (a)
When AlCl_3 reacts with NaOH, it forms sodium meta aluminate (NaAlO_2). This reaction does not give gaseous product.
$$\text{AlCl}_3 + 4\text{NaOH} \rightarrow \text{NaAlO}_2 + 2\text{H}_2\text{O} + 3\text{NaCl}$$

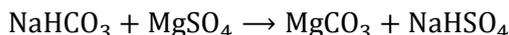
sodium meta aluminate (soluble)
- 6 (d)
Farther away is shell from the nucleus, more loosely are held electrons.
- 7 (d)
 BaSO_4 has high lattice energy and low hydration energy.
- 8 (b)
 O_2^{1-} can be oxidised to O_2 and can be reduced to O^{2-} .
- 9 (a)
It is a fact.
- 10 (c)
Ionic radius increases down the gp.
- 11 (c)
$$\text{Ba}^+ + e \rightarrow \text{Ba}$$

$$\text{Be}^+ \rightarrow \text{Be}^{2+} + e$$
- 12 (a)
Sodium metal is manufactured by the electrolysis of fused sodium chloride mixed with KCl and KF.
On electrolysis ;
At iron cathode
$$\text{Na}^+ + e^- \rightarrow \text{Na (s)}(\text{metallic sodium})$$

At graphite anode :

Both Ca and P are needed for human system. Also they prevent moisture absorbing power of other components present in table salt.

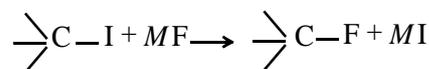
27 (d)



29 (d)

Cs has lowest ionisation energy and thus easily show photoelectric effect, the principle used in solar cells.

30 (c)



It is Swartz reaction that uses highly soluble metal fluorides. So, the correct choice is RbF.

31 (a)

Indian saltpetre is KNO_3 .

32 (d)

It is a fact.

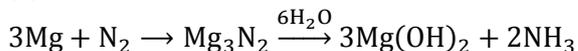
33 (a)

Lithium salts impart bright red colour to the flame

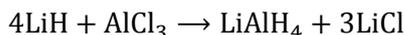
34 (d)

It should be $\text{Na}_2\text{CO}_3 + \text{CaS}$.

35 (a)



36 (b)



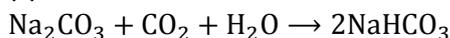
37 (b)

Mg^{2+} is smaller than Na^+ and larger than all others. Smaller is ion, more is hydration energy.

38 (c)

As we go down in the group, ionic character increases hence, melting point of halides should increase but NaCl has the highest melting point (800°C) due to its high lattice energy.

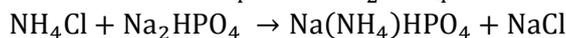
39 (c)



40 (b)

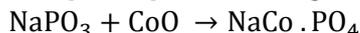
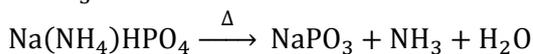
Microcosmic salt is $\text{Na}(\text{NH}_4)\text{HPO}_4$. It is white crystalline solid.

It is obtained when NH_4Cl and Na_2HPO_4 are dissolved in hot water and cooled.



It is separated by fractional crystallisation.

It is used for the detection of certain basic radicals which forms coloured mixed phosphate with NaPO_3 .



blue bead

41 (b)

The disproportionation occurs as:



42 (d)

Saline hydrides are ionic in nature.

43 (c)

Chlorophyll -'a' is $\text{C}_{55}\text{H}_{72}\text{O}_5\text{N}_4\text{Mg}$; Chlorophyll-'b' is $\text{C}_{55}\text{H}_{70}\text{O}_6\text{N}_4\text{Mg}$; Both are green plant pigment.

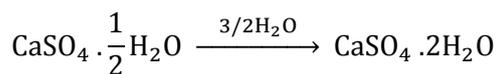


- 44 (c)
Carnallite ($\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$), dolomite ($\text{MgCO}_3 \cdot \text{CaCO}_3$) and sea water are the ores of magnesium, calamine (ZnCO_3) is an ore of zinc.
- 45 (a)
These react with H_2SO_4 to give CO_2 used for extinguishing fire.
- 46 (a)

$$\text{Na}_2\text{SO}_3 + \text{S} \xrightarrow{\text{NaOH}} \text{Na}_2\text{S}_2\text{O}_3$$

sodium thiosulphate
- 47 (b)
Francium (at. No. 87) is radioactive. Sodium isotopes are also radioactive (N^{24}).
- 48 (a)
 MgCl_2 is hygroscopic.
- 50 (b)
 Li^+ has $1s^2$ configuration, *i. e.*, nearest noble gas configuration.
- 51 (d)
 $\text{Na}_2\text{S}_2\text{O}_3$ reacts with AgBr (photography) and with I_2 (iodometric and iodimetric titrations).
- 52 (d)
Sodium sulphate decahydrate ($\text{Na}_2\text{SO}_4 \cdot 10 \text{H}_2\text{O}$) is also known as Glauber's salt.
- 53 (b)
Na is basic in nature and forms basic oxides.
- 54 (c)
It is a fact.
- 56 (c)
NaOCl is used as a bleaching agent and sterilising agent. It is formed by the action of Cl_2 with cold and dilute NaOH.
- $$2\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{NaOCl} + \text{H}_2\text{O}$$
- Cold and dil.
- $$6\text{NaOH} + 3\text{Cl}_2 \rightarrow 5\text{NaCl} + \text{NaClO}_3 + 3 \text{H}_2\text{O}$$
- Hot and conc.
- 57 (d)
Jump in IP is noticed during the change of shell.
- 58 (b)
 $\text{NaOH} + \text{CaO}$ is called soda lime. 3 : 1
- 59 (c)
 $\text{Na}_2\text{S} + \text{I}_2 + \text{Na}_2\text{SO}_3 \rightarrow \text{Na}_2\text{S}_2\text{O}_3 + 2\text{NaI}$
- 60 (b)
 Al^{3+} is very good coagulant for negatively charged dispersions in water.
- 61 (d)
It is a fact.
- 62 (c)
Sodium bicarbonate decomposes on strong heating and gives sodium carbonate.
- $$2\text{NaHCO}_3 \xrightarrow{\Delta} \text{Na}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O}$$
- 63 (d)

Plaster of Paris absorb water to form monoclinic gypsum which is a hard substance.



monoclinic gypsum

64 (d)

Halides of alkaline earth metals possess all these properties.

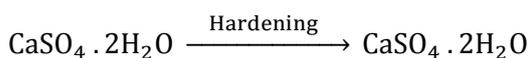
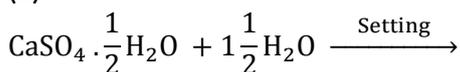
65 (a)

Alkali and alkaline earth metals are extracted by the electrolysis of their fused salt.

66 (a)

It is a reason for given fact.

67 (b)



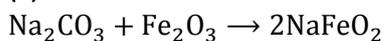
68 (c)

It is a reason for given fact.

69 (b)

Na^+ is preferentially discharged on Hg electrode.

70 (a)



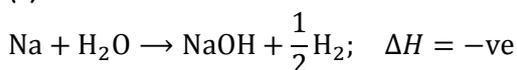
71 (b)

Cationic radius increases down the group and decreases along the period.

72 (b)

Abundance ratio is $\text{Ca} > \text{Mg} > \text{Be} > \text{Sr} \sim \text{Ba} > \text{Ra}$.

73 (c)



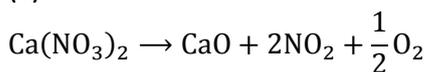
74 (b)

In II-A group, the stability of carbonates increase with the rise in atomic number due to small size of the resulting oxide ion.

i.e.,



75 (d)



Ca imparts brick red colour to flame.

76 (d)

Magnesium (Mg) cannot be obtained by the electrolysis of its aqueous salt solution because when it is liberated at cathode, at once reacts with H_2O to give metal hydroxide and hydrogen.

77 (a)

On moving down the second group the thermal stability of alkaline earth metal carbonates increases.

Hence, MgCO_3 , being the carbonate of upper element, decomposes at lowest temperature.

78 (c)

Violet colour to flame is characteristic of potassium. Also aqueous solution of K_2CO_3 is alkaline.

79 (c)

BaSO_4 is insoluble in NH_3 and hot water.

80 (a)
A suspension of $\text{Mg}(\text{OH})_2$ in water is used as antacid under the name of milk of magnesia.

81 (a)
 MgO is basic; rest all are amphoteric.

82 (a)
It is an use of Mg .

83 (a)
For an ionic compound if lattice energy $<$ its hydration energy, it is water soluble.

84 (d)
$$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O} \xrightarrow{\Delta} \text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O} \xrightarrow{\Delta} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} \uparrow$$

85 (d)
Anhydrous calcium chloride is used in the laboratory for fast drying of neutral gases

86 (a)
 Ag and Hg oxides decompose on heating.

87 (d)
$$\text{NaCl} + \text{H}_2\text{O} \rightarrow \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})$$

88 (a)
The lattice energy of alkali metal halides decreases down the group due to increase in size of alkali metals. Thus,

LiCl	NaCl	KCl	RbCl	CsCl
883°C	808°C	772°C	717°C	645°C

89 (c)
$$\text{CO} + \text{NaOH} \xrightarrow[\text{High } P]{200^\circ\text{C}} \text{HCOONa}$$

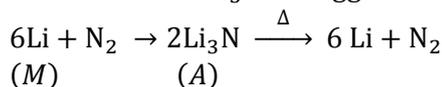
The only reaction in which carbon monoxide (a neutral oxide of carbon) acts as an acid.

90 (d)
These are various names for NaCl .

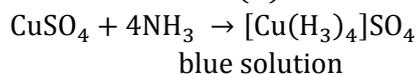
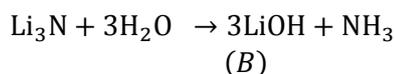
91 (a)
It is reason for the given fact.

92 (c)
Both Be and Al are rendered passive due to the formation of inert, insoluble and impervious oxide layer on their surface.

93 (b)
The formula of 'A' is M_3N . It suggests that M is a monovalent metal.



lithium nitride

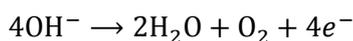


Hence, M and B are Li and NH_3 respectively.

94 (c)
In Castner process the process of extracting sodium metal can be written as,



Its oxidation reaction which occurs at anode is



95

(a)

The basic character of oxides decreases along the period.

96

(c)

It is a reason for given fact.

97

(b)

When CO_2 gas is passed through a brine solution (28% NaCl) saturated with ammonia, it gives sodium bicarbonate which on drying and heating gives sodium carbonate.

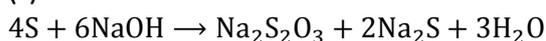
98

(d)

It is a fact.

99

(c)



100

(d)

Mg alloys are lighter.

101

(d)

When carbonates are heated, they decompose to form the oxide. Sodium carbonate and potassium carbonate do not decompose. The carbonate become more difficult to decompose as we go down the 1st group

102

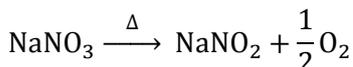
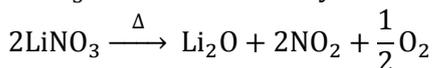
(d)

Cd does not react with NaOH .

103

(b)

LiNO_3 behaves differently from other alkali metal nitrates.



104

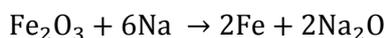
(a)

$\text{CaO} + \text{CO}_2 \rightarrow \text{CaCO}_3$; CO_2 does not react with NaHCO_3 .

105

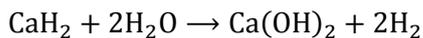
(b)

Alkali metals have only one electron in their ultimate shell, hence they can easily donate electron and act as reductant *e.g.*,



106

(c)



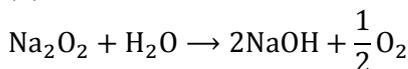
107

(b)

In rest all NaOH is used.

108

(d)



109

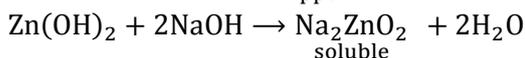
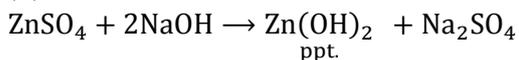
(d)

Na_2CO_3 reacts with MgSO_4 to give basic magnesium carbonate.



110

(b)





- 111 (b)

$$\text{MgCO}_3 \xrightarrow{\text{Heat}} \text{MgO} + \text{CO}_2$$
 The metal oxide of which is stable, has unstable carbonate
- 112 (d)
 Alkali metal hydroxides are more stronger base than alkaline earth metal hydroxides. Also basic character of hydroxides of alkaline earth metals increase down the gp.
- 113 (a)
 The chemical formula of feldspar is KAlSi_3O_8 .
- 114 (a)
 The basic character of oxides increases down the gp.
- 115 (c)
 Mg^{2+} is smallest cation; Cl^- is larger than F^- .
- 116 (b)
 The electropositive character increases down the group; (a) and (b) are 1 group elements.
- 117 (c)
 NaOH absorbs moisture and CO_2 from air to form Na_2CO_3 ;

$$2\text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$$
- 118 (b)
 The standard oxidation potential increases from Be to Ba, hence their reducing property also increases from Be to Ba.
- 119 (a)

$$\text{MNO}_3 \xrightarrow{\Delta} \text{MNO}_2 + \frac{1}{2}\text{O}_2$$
- 120 (c)
 Cathode: $2\text{H}_2\text{O} + 2e \rightarrow \text{H}_2 + 2\text{OH}^-$
 Anode: $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2e$
- 121 (a)
 PbCl_2 is insoluble in cold water. Mg^{2+} and Pb^{2+} do not show flame colour.
- 122 (a)
 All alkali metal salts are soluble in water. The degree of hydration depends upon the size of the cation. Smaller the size of cation, greater is its charge density and hence, greater is its tendency to withdraw electrons from molecules which are thus polarised. Li^+ ion being smallest in size among alkali metal ions is the most extensively hydrated while Cs^+ ion the largest alkali metal ion is the least hydrated. The size of hydrated alkali ions is as

$$\text{Li}^+ > \text{Na}^+ > \text{K}^+ > \text{Rb}^+ > \text{Cs}^+$$
 (Relative ionic radii in water)
 (Relative degree of hydration)
- 123 (c)
 Mme Curie and her husband Piere Curie isolated radium from pitch blende.
- 124 (a)
 Gun powder is an explosive mixture containing $\text{KNO}_3 + \text{Charcoal} + \text{S}$
- 125 (a)
 Only Li combines directly with nitrogen to form lithium nitride,

$$6\text{Li} + \text{N}_2 \rightarrow 2\text{Li}_3\text{N}$$

- 126 (a)
When KI is added to acidified solution of sodium nitrite NO gas is liberated and I₂ is set free.
$$2\text{I}^- + 4\text{H}^+ + 2\text{NO}_2^- \rightarrow 2\text{NO} + \text{I}_2 + 2\text{H}_2\text{O}$$
- 127 (c)
When carbon monoxide is passed over solid caustic soda at 200°C, sodium formate is obtained.
$$\text{CO} + \text{NaOH} \xrightarrow{200^\circ\text{C}/10 \text{ atm}} \text{HCOONa}$$

sodium formate
- 128 (b)
Sodium thiosulphate, Na₂S₂O₃ gets oxidised by chlorine water.
$$\text{Na}_2\text{S}_2\text{O}_3 + 4\text{Cl}_2 + 5\text{H}_2\text{O} \rightarrow 2\text{NaHSO}_4 + 8\text{HCl}$$
- 129 (d)
Hasenclever plant (old method), Beckmann's plant (new method) are the commercial method to obtain bleaching powder by:
$$2\text{Cl}_2 + 3\text{Ca}(\text{OH})_2 \xrightarrow[\text{lime}]{\text{Dry slaked}} \underbrace{\text{Ca}(\text{OCl}_2) + \text{CaCl}_2 \cdot \text{Ca}(\text{OH})_2\text{H}_2\text{O}}_{\text{Bleaching powder}} + \text{H}_2\text{O}$$
- 130 (a)
Be (Z = 4) has maximum covalency of 4 while Al(Z = 13) has maximum covalency of 6.
- 131 (c)
Dolomite is CaCO₃ · MgCO₃.
- 132 (b)
A deliquescent substance absorbs water to the extent that it forms a saturated solution.
- 133 (c)
Tincal is also known as borax; a natural mineral of Na and B.
- 134 (b)
Sodium vapours on heating emit yellow light.
- 135 (d)
$$\text{CaCN}_2 + 3\text{H}_2\text{O} \rightarrow \text{CaCO}_3 + \text{NH}_3$$
- 136 (c)
N³⁻ has 7p, 10e and 7n.
- 138 (a)
Nitrolim is CaCN₂ + C.
- 139 (b)
$$\text{Mg} + 2\text{HNO}_3(\text{dil.}) \rightarrow \text{Mg}(\text{NO}_3)_2 + \text{H}_2$$

Hence, MgO is not formed in this reaction.
- 140 (a)
On heating, it decomposes with evolution of CO₂.
$$\text{MgCO}_3 \xrightarrow{\Delta} \text{MgO} + \text{CO}_2$$
- 141 (c)
Because of the larger size and smaller nuclear charge, alkali metals have low ionisation potential relative to alkaline earth metals

**Assertion - Reasoning Type**

This section contain(s) 4 questions numbered 1 to 4. Each question contains STATEMENT 1(Assertion) and STATEMENT 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- a) Statement 1 is True, Statement 2 is True; Statement 2 is correct explanation for Statement 1
- b) Statement 1 is True, Statement 2 is True; Statement 2 is **not** correct explanation for Statement 1
- c) Statement 1 is True, Statement 2 is False
- d) Statement 1 is False, Statement 2 is True

- 1 **Statement 1:** Gypsum is added to cement to increase its rate of setting.
Statement 2: Gypsum is calcium sulphate hemihydrates.
- 2 **Statement 1:** Radium is most abundant s block elements.
Statement 2: S block elements are non radioactive in nature.
- 3 **Statement 1:** Group 1 elements are known as the alkali elements.
Statement 2: S orbital can accommodate only two electrons.
- 4 **Statement 1:** S block elements are highly electropositive.
Statement 2: The valance electrons present in s orbital are loosely held.



: ANSWER KEY :

1)	d	2)	d	3)	b	4)	a
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: HINTS AND SOLUTIONS :

- 1 (d)
Gypsum is added to cement to decrease its rate of setting.
Gypsum is calcium sulphate dehydrate.
- 2 (d)
Radium is rarest of all *s*-block elements. Francium is radioactive. Its long lived isotope Fr^{223} has a half-life of only 21 min.
- 3 (b)
1. If Assertion is True, Reason is True, Reason is correct explanation of 1
2. If Assertion is True, Reason is True, Reason is not correct explanation of 1
3. If Assertion is True, Reason is False
4. If Assertion is False, Reason is True
- 4 (a)
The loosely held *s*-electron in the outermost valence shell of these elements makes them, the most electropositive metals which readily give ion's M^+ or M^{2+} .

